

WHAT IS CLAIMED IS:

1. A stage unit comprising:
a driver that includes a mover and a stator; and
5 a reaction canceling mechanism that applies to the stator a force to cancel a reaction acting on the stator due to driving of the mover by an electromagnetic interaction.
- 10 2. The stage unit according to claim 1, wherein the reaction canceling mechanism generates forces, which cancel the reaction as a whole, in at least two points of the stator.
- 15 3. The stage unit according to claim 2, wherein the reaction acting on the stator and the forces generated in at least two points are along a plane.
- 20 4. The stage unit according to claim 2 or 3,
which cancel the reaction as a whole and have respective
61 predetermined directions, in at least three points of the stator.
- 25 5. The stage unit according to claim 1, wherein the driver generates a driving force of the mover by an electromagnetic interaction.

6. The stage unit according to claim 5, wherein
the stator comprises an armature unit including a
plurality of armature coils that are arranged in the
shape of a matrix and have current paths almost parallel
5 to the predetermined plane, and

the mover comprises a driving magnetic pole unit
that generates a magnetic flux having a direction that
cross the predetermined plane.

10 7. The stage unit according to claim 6, wherein
the reaction canceling magnetic pole unit comprises
reaction canceling magnetic pole units that generate
magnetic fluxes crossing the current paths of armature
coils arranged on the four corners of the armature unit;
15 and

a control system that controls the directions and
amplitudes of currents supplied to the armature coils
arranged on the four corners of the armature unit.

20 8. The stage unit according to claim 7, wherein the
reaction canceling magnetic pole units and the stator are
mechanically independent of each other.

9. The stage unit according to claim 7 or 8,
25 wherein the reaction canceling magnetic pole units
91 generate forces perpendicular to one another on the
neighboring corners of the armature unit.

10. The making method of a stage unit comprising the steps of:

providing a driver including a mover and a stator;
and

5 providing the reaction canceling mechanism that applies a force to cancel the reaction acting on the stator due to driving of the mover to the stator by an electromagnetic interaction.

10 11. A stage unit comprising:

an armature unit that includes a plurality of armature coils, which are arranged in the shape of a matrix and have current paths almost parallel to the predetermined plane;

15 a magnetic pole unit that has a plurality of magnets magnetized in directions not perpendicular to the predetermined plane and two-dimensionally generates an alternating magnetic field with a period of $4P/3$ in two axis-directions perpendicular to each other, between the
20 armature coils and itself, practically without generating any magnetic field in an area opposite to the armature unit; and

a current driver that moves the magnetic pole unit relatively to the armature unit in a plane parallel to
25 the predetermined plane by supplying currents to the respective armature coils.

12. The stage unit according to claim 11 further

comprising:

a magnetic member supporting the armature coil in a side opposite with the magnetic pole unit.

5 13. The stage unit according to claim 11 further comprising:

a flat-plate-like shaped member that is placed between the armature unit and the magnetic pole unit and made of a non-magnetic material.

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14. The stage unit according to claim 11, wherein the current driver supplies currents to the respective armature coils independently.

15 15. The stage unit according to one of claim 11 to 14 further comprising:

9) a position detection system that detects the positional relation between the magnetic and the armature unit; and

20 a controller that controls at least one of the value and direction of currents supplied to the respective armature coils via the current driver according to the detection results of the position detection system.

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16. The stage unit according to claim 15, wherein the control selectively supplies currents only to the armature coils opposite with the magnetic pole unit.

17. The making method of a stage unit comprising the steps of:

providing an armature unit that includes a plurality
5 of armature coils, which are arranged in the shape of a matrix and have current paths almost parallel to the predetermined plane;

providing a magnetic pole unit that has a plurality of magnets magnetized in directions not perpendicular to
10 the predetermined plane and two-dimensionally generates an alternating magnetic field with a period of $4P/3$ in two axis-directions perpendicular to each other, between the armature coils and itself, practically without generating any magnetic field in an area opposite to the
15 armature unit; and

providing a current driver that moves the magnetic pole unit relatively to the armature unit in a plane parallel to the predetermined plane by supplying currents to the respective armature coils.

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18. The making method of a stage unit according to claim 17 further comprising the steps of:

providing a position detection system that detects the positional relation between the magnetic and the
25 armature unit; and

providing a controller that controls at least one of the value and direction of currents supplied to the respective armature coils via the current driver

according to the detection results of the position detection system.

5 19. An exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, comprising:

a stage unit according to claim 1 or 11 as the position controller to control the position of the wafer.

10 20. The making method of an exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, comprising the steps of:

15 making a stage unit by providing the reaction canceling mechanism that applies a force, which cancels the reaction acting on the stator due to driving of the mover, to the stator by an electromagnetic interaction; and

20 placing the stage unit as the position controller that controls the position of the wafer.

21. The making method of an exposure apparatus that transfers a predetermined pattern onto a wafer by irradiating an energy beam and exposing the wafer, 25 comprising the steps of:

making a stage unit by providing an armature unit including a plurality of armature coils that are arranged in the shape of a matrix and have current paths almost

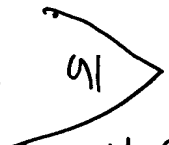
parallel to the predetermined plane; a magnetic pole unit that has a plurality of magnets magnetized in directions not perpendicular to the predetermined plane and two-dimensionally generates an alternating magnetic field

5 with a period of $4P/3$ in two axis-directions perpendicular to each other, between the armature coils and itself, practically without generating any magnetic field in an area opposite to the armature unit; and a current driver that moves the magnetic pole unit

10 relatively to the armature unit in a plane parallel to the predetermined plane; and

placing the stage unit as the position controller that controls the position of the wafer.

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91°
 $91^\circ C / 91^\circ S$